

**Practice: 578 - Stream Crossing****Scenario: #2 - Culvert installation****Scenario Description:**

Install a new culvert. Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and building headwalls. If a different travel surface is needed, refer to another appropriate standard for the surfacing. 36 inch Culvert installation with <75 cy of fill needed and < 2 yds rock riprap for headwalls. Pipe is 40 feet long. Use of this option assumes permits require extensive stream diversion or pumping bypass during construction. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Use (587) Structure for Water Control instead, for ditch cross culverts and other intermittent flows.

Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization. (561) Heavy Use Area, (382) Fence

**Before Situation:**

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

**After Situation:**

Access road and waterflow are able to cross each other in a stable manner. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Typical crossing is 36" diameter pipe by 40 foot long. Practice payment based on diameter in inches times the length of pipe in feet.

**Scenario Feature Measure:** Culvert, inches diameter x length of pipe

**Scenario Unit:** Inch-Foot

**Scenario Typical Size:** 1,440

**Scenario Cost:** \$12,207.33

**Scenario Cost/Unit:** \$8.48

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	\$5.76	18	\$103.68
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	\$191.30	20	\$3,826.00
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$130.06	10	\$1,300.60
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$20.77	20	\$415.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$28.85	20	\$577.00
<b>Materials</b>						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$31.83	50	\$1,591.50
Pipe, HDPE, CPT, Double Wall, Soil Tight, 36"	1248	Pipe, Corrugated HDPE Double Wall, 36" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	\$35.17	40	\$1,406.80
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$78.21	27	\$2,111.67
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$291.56	3	\$874.68

**Practice: 578 - Stream Crossing****Scenario: #3 - Ford with Water Management****Scenario Description:**

To install a stable crossing medium on channel bottom and approaches. Medium includes but not limited to precast concrete blocks, geocells, pavers, and gabions. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream has 30 foot bottom width and approaches. Width is 12 feet for a total area as 420sf with total at 600sf. Use this option if permits require extensive stream diversion or pumping bypass during construction. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Scenario does not include cattle slats.

Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization, (561) Heavy Use Area, (382) Fence,

**Before Situation:**

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

**After Situation:**

Access road and waterflow are able to cross each other in a stable manner. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross.

**Scenario Feature Measure:** low water crossing

**Scenario Unit:** Square Foot

**Scenario Typical Size:** 600

**Scenario Cost:** \$10,566.15

**Scenario Cost/Unit:** \$17.61

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$76.63	16	\$1,226.08
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	\$2.06	18	\$37.08
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	\$110.41	2	\$220.82
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	\$191.30	20	\$3,826.00
<b>Labor</b>						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$28.85	2	\$57.70
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$20.77	40	\$830.80
<b>Materials</b>						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$78.21	20	\$1,564.20
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$31.40	6	\$188.40
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$31.83	18	\$572.94
Block, pre-cast concrete, modular	1496	Pre-cast concrete blocks, typically 2ft x 2ft x 6ft, includes installation and delivery.	Cubic Yard	\$97.51	1.2	\$117.01
GeoCell, 4"	1054	Polymer 3-D cellular grid 4" deep that is filled with stone or earth. Includes materials, labor and equipment for the geocell only, does not include backfill.	Square Yard	\$26.84	50	\$1,342.00

**Mobilization**

**Mobilization**

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$291.56	2	\$583.12
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**Practice: 578 - Stream Crossing****Scenario: #4 - Ramp only****Scenario Description:**

Install a stable ramp for a channel crossing with a stable bottom. Medium includes but not limited to precast concrete blocks, geocells, pavers, and rip rap. Cattle slats are found under a separate scenario. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Approach stabilization paid by associated practices.

Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization, (561) Heavy Use Area, (382) Fence,

**Before Situation:**

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

**After Situation:**

A 12' Wide ramp is installed at a 5:1 slope on a 4' bank height for a total area of 240 SF per approach or 480 SF total. Access road, animal trails and walkway, heavy use area and waterflow are able to cross each other in a stable manner. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Payment measured from top of ramp to toe of slope times design width using low bank to set top of ramp. Areas above this that need stabilization paid under associated practices.

**Scenario Feature Measure:** Square foot of approach

**Scenario Unit:** Square Foot

**Scenario Typical Size:** 480

**Scenario Cost:** \$3,374.51

**Scenario Cost/Unit:** \$7.03

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	\$63.85	4	\$255.40
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	\$66.43	4	\$265.72
<b>Labor</b>						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$41.91	4	\$167.64
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$28.85	4	\$115.40
<b>Materials</b>						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$31.40	6	\$188.40
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$78.21	23	\$1,798.83
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$291.56	2	\$583.12

**Practice: 578 - Stream Crossing****Scenario: #5 - Ramps and channel****Scenario Description:**

Install a stable ramp and stabilize bottom for a channel crossing with an unstable bottom. Medium includes but not limited to precast concrete blocks, geocells, pavers, and rip rap. Cattle slats are found under a separate scenario. If a different travel surface is needed, refer to another appropriate standard for the surfacing. State permits have minimal requirements for water management during installation. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Approach stabilization paid by associated practices.

Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization, (561) Heavy Use Area, (382) Fence,

**Before Situation:**

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

**After Situation:**

A 12' Wide ramp is installed at a 5:1 slope on a 4' bank height for a total area of 240 SF per approach or 480 SF total for ramps. In addition, a 30' long bottom is also stabilized for an additional 360 SF or a total of 600 SF. Access road, animal trails and walkway, heavy use area and waterflow are able to cross each other in a stable manner. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Payment measured from top of ramp to toe of slope times design width using low bank to set top of ramp plus the width of the channel bottom times the width. Areas above this that need stabilization paid under associated practices.

**Scenario Feature Measure:** SF of total crossing

**Scenario Unit:** Square Foot

**Scenario Typical Size:** 600

**Scenario Cost:** \$3,571.92

**Scenario Cost/Unit:** \$5.95

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	\$63.85	5	\$319.25
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	\$66.43	4	\$265.72
<b>Labor</b>						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$28.85	5	\$144.25
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$41.91	5	\$209.55
<b>Materials</b>						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$78.21	23	\$1,798.83
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$31.40	8	\$251.20
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$291.56	2	\$583.12

**Practice: 578 - Stream Crossing****Scenario: #6 - Ramp only with Cattle or Hog Slats****Scenario Description:**

Install a stable ramp for a channel crossing with a stable bottom. Medium limited to precast concrete cattle or hog slats laid over a subbase with stone to protect the side slopes. If a different travel surface is needed, use Ramp only option for the surfacing. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Approach stabilization paid by associated practices.

Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization, (561) Heavy Use Area, (382) Fence,

**Before Situation:**

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

**After Situation:**

A 12' Wide ramp is installed at a 5:1 slope on a 4' bank height for a total area of 240 SF per approach or 480 SF total. Access road, animal trails and walkway, heavy use area and waterflow are able to cross each other in a stable manner. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Payment measured from top of ramp to toe of slope times design width using low bank to set top of ramp. Areas above this that need stabilization paid under associated practices.

**Scenario Feature Measure:** Square foot of approach

**Scenario Unit:** Square Foot

**Scenario Typical Size:** 480

**Scenario Cost:** \$4,874.69

**Scenario Cost/Unit:** \$10.16

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	\$63.85	4	\$255.40
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	\$66.43	4	\$265.72
<b>Labor</b>						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$41.91	4	\$167.64
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$28.85	4	\$115.40
<b>Materials</b>						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$78.21	23	\$1,798.83
Cattle Slats	2553	Cattle/Hog slats (new, used or seconds) or Stream Crossing Slats placed in streams needed to prevent injury to cattle by creating stable footing. Includes materials only.	Square Foot	\$3.12	480	\$1,497.60
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$31.83	6	\$190.98
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$291.56	2	\$583.12

**Practice: 578 - Stream Crossing****Scenario: #7 - Ramps and channel with Cattle or Hog Slats****Scenario Description:**

Install a stable ramp and stabilize bottom for a channel crossing with an unstable bottom. Medium limited to precast concrete cattle or hog slats laid over a stone subbase with riprap to protect the side slopes. If a different travel surface is needed, use Ramp and channel option for the surfacing. State permits have minimal requirements for water management during installation. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Approach stabilization paid by associated practices.

Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization, (561) Heavy Use Area, (382) Fence,

**Before Situation:**

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

**After Situation:**

A 12' Wide ramp is installed at a 5:1 slope on a 4' bank height for a total area of 240 SF per approach or 480 SF total for ramps. In addition, a 30' long bottom is also stabilized for an additional 360 SF or a total of 600 SF. Access road, animal trails and walkway, heavy use area and waterflow are able to cross each other in a stable manner. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Payment measured from top of ramp to toe of slope times design width using low bank to set top of ramp plus the width of the channel bottom times the width. Areas above this that need stabilization paid under associated practices.

**Scenario Feature Measure:** SF of total crossing

**Scenario Unit:** Square Foot

**Scenario Typical Size:** 600

**Scenario Cost:** \$8,931.69

**Scenario Cost/Unit:** \$14.89

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	\$66.43	4	\$265.72
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	\$63.85	5	\$319.25
<b>Labor</b>						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$41.91	5	\$209.55
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$28.85	5	\$144.25
<b>Materials</b>						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$78.21	23	\$1,798.83
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$31.83	39	\$1,241.37
Cattle Slats	2553	Cattle/Hog slats (new, used or seconds) or Stream Crossing Slats palced in streams needed to prevent injury to cattle by creating stable footing. Includes materials only.	Square Foot	\$3.12	1320	\$4,118.40
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$31.40	8	\$251.20
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$291.56	2	\$583.12